(No Model.)

F. SARGENT.

STEAM ENGINE INDICATOR.

No. 450,731. Patented Apr. 21, 1891.

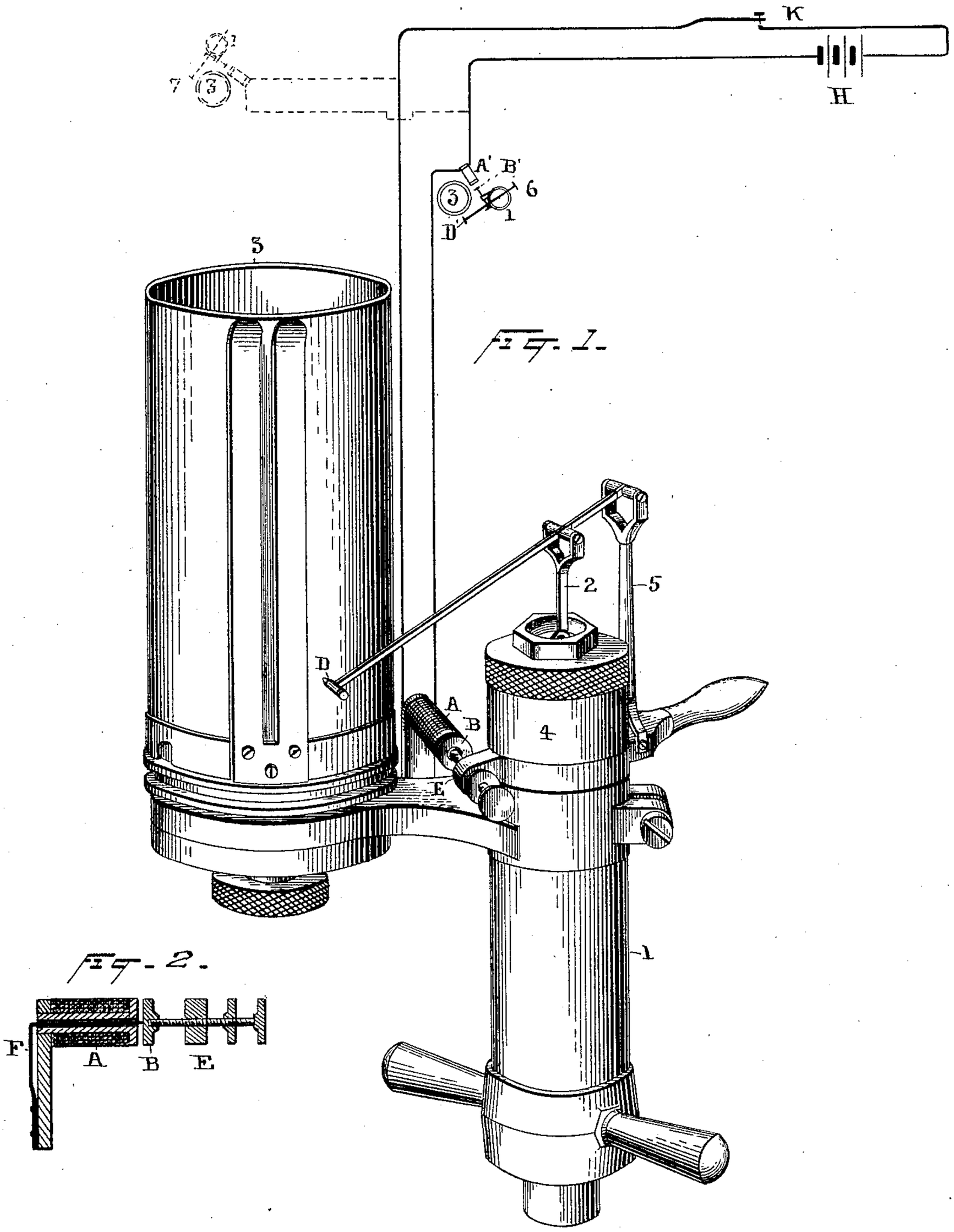

Fig. 1.

Fig. 2.

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STEAM-ENGINE INDICATOR.

SPECIFICATION forming part of Letters Patent No. 450,731, dated April 21, 1891.

Application filed February 17, 1890. Serial No. 340,677. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK SARGENT, a subject of the Queen of Great Britain, residing at New York city, in the county and State of New York, have invented a certain new and useful Improvement in Steam-Engine Indicators for Steam, Gas, Pneumatic, and Hydraulic Machinery, of which the following is a specification.

The objects of my invention are to arrange an indicator so that it can be operated from a distance and to arrange several indicators so that they may be operated from a distance simultaneously and at the exact instant desired, as will be hereinafter fully described.

It is often desirable to indicate at the same instant in several independent cylinders, pumps, or like devices—for instance, in the case of a triple expansion-engine with indicators placed on the ends of each cylinder. Heretofore it has been practically impossible to operate the several indicators at exactly the same moment and for the same period of time, for each indicator was separately controlled, and it was impossible for one or several operators to work them all in exact harmony.

My invention provides a means whereby the recording device of an indicator can be operated from a distance, whereby the recording devices of several indicators can be operated at the same instant, and whereby the time of contact of the recording devices at each indicator can be made of exactly the same duration, and whereby one person can control by a single operation the contact of the recording devices of all the indicators.

In the accompanying drawings, which illustrate my invention, Figure 1 is a perspective view of one well-known form of indicator and recorder with my improvement embodied therein; and Fig. 2 is a sectional view of the operating-magnet, showing a retracting-spring for the armature.

1 is a steam-cylinder in which is a piston connected with rod 2, pivoted to the arm carrying the marking point or stylus D, which is fulcrumed in the ordinary way, as shown in the drawings.

3 is a cylinder, which may be made to revolve, preferably, by a connection with the piston in the usual manner, and which carries a card or paper forming the recording-surface for the pencil D. The groove around cylinder 3 above the supporting-bracket is intended for the reception of a cord, the free end of which will be connected directly or indirectly to the piston of the engine. By moving the cylinder by the engine, instead of by an independent motor, it is evident that the condition of the steam at any particular portion of the stroke can be recorded, since the movement of the recording-surface corresponds exactly to that of the piston.

Near the top of the steam-cylinder is an encircling sleeve 4, upon an extension on which is supported the rod 5, forming the fulcrum of the pencil-carrying lever. On the opposite side of said sleeve 4 is an extension E, which carries an armature B, adjustable to or from the magnet by means of the supporting-screw, which passes through extension E. The sleeve above referred to turns loosely on the cylinder, and as the sleeve turns in one direction or the other the pencil D is raised from or moved onto the recording-surface. A is an electro-magnet mounted upon or adjacent to the frame of the indicator with its pole in proximity to the armature B. This magnet is in a circuit including a battery H, extending to any suitable circuit-controller K, from which point it is desired to control the recorder. An operator at K by closing the key can at any instant energize the magnet, thereby attracting the armature, turning the sleeve 4, and moving the pencil onto the recording-surface, where it will remain as long as the circuit is held closed, thus making a mark due to the movement of the recording-surface and to the movement of the pencil due to variations of pressure in cylinder 1, as is well understood. As soon as the circuit is broken a spring or other suitable device draws or forces the armature back to its original position. F in Fig. 2 is a spring for this purpose. It is shown attached at the rear of the magnet and extending through the core thereof, its end bearing against the armature. This spring is strong enough to overcome the friction of the sleeve 4 and to turn the same, thereby raising and holding the pencil from the paper and preventing false marks. The sleeve may be turned by hand at any time to raise or lower the stylus, if desired.

Thus far I have described the construction and operation of a single indicator; but I propose to place several indicators in series or in multiple arc in the same circuit for the purpose of controlling them simultaneously, and in Fig. 1 I have diagrammatically indicated such an arrangement. At 6 is a second indicator, preferably like that above described, and like parts are correspondingly lettered. The magnet A′ is directly in series with magnet A, and when energized attracts the armature B′, drawing the pencil D′ against the recording-surface. At 7 is another apparatus of the same character in a mutiple-arc branch, which branch is provided with a switch whereby the apparatus can be thrown into or out of circuit.

While I have described one form of indicator and recorder, it should be understood that I do not limit myself to this form, since the invention does not reside in a particular indicator and recorder, but in an arrangement of devices for operating any similar indicator or series of indicators. Neither do I confine myself to the exact arrangement of circuits which I have shown and described, since they may be modified largely without departing from the spirit of my invention.

Having thus described my invention, what I claim is—

1. The combination of two or more indicators the recording-surfaces of which are moved by the engine or apparatus to which the indicators are attached, with electro-magnets for controlling the contact between the recording-surface and stylus and a single circuit embracing all of said magnets, substantially as described.

2. The combination, in an indicator and recorder, of a cylinder the pressure in which controls the position in one direction of a recording-stylus, a movable recording-surface, a loose sleeve supporting the stylus-carrying arm and an armature, and a magnet supported adjacent to said armature and included in a circuit, substantially as described.

3. The combination, in an indicator and recorder, of a cylinder the pressure in which controls the position in one direction of a recording-stylus, a movable recording-surface, a loose sleeve supporting the stylus-carrying arm and an armature, a magnet supported adjacent to said armature and included in a circuit, and a spring for retracting the armature, substantially as described.

This specification signed and witnessed this 11th day of February, 1890.

FREDERICK SARGENT.

Witnesses:
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